wishes, further, to acknowledge the kindly interest and helpful suggestions of Dr. Geo. F. McEwen, S. W. Chambers, and Drs. D. L. Fox and C. E. Zobell, also of the Scripps Institution.

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DUSTSTORMS OF JANUARY–APRIL 1937 IN THE UNITED STATES

By R. J. MARTIN

[Weather Bureau, Washington, June 1937]

Precipitation for the first 3 months covered by this summary averaged above normal in all but five States, in four of which rather severe duststorms occurred during the period. January, with the greatest percentages of normal precipitation in the Plains States and most of the Dust Bowl, had the fewest duststorms, while March, with substantial to heavy precipitation in the Plains States, and much less than normal in most eastern sections, had the most extensive storms. April brought above-normal precipitation to the far Northwest, portions of the northern Great Plains, the middle and upper Mississippi Valleys, and, except for Arkansas, Louisiana, Mississippi, and Tennessee, to all States east of the ninety-fifth meridian.

During January, widespread dusty conditions prevailed over a large central area, reaching from Illinois westward to eastern Wyoming. These duststorms, mostly light, were scattered throughout the month, but were most numerous during the latter half; dense dust was reported in portions of New Mexico, Oklahoma, Texas, Colorado, and one or two other Southwestern States. Colorado had an unusual number of violent duststorms during the month in southeastern counties, where soil blew badly with only light to moderate wind movement; in Baca and Prowers Counties the storms were severe on the 5th, 13th, 15th, 17th, 23d, 27th, and 31st, with an average duration of 6 hours, and average visibility of from three city blocks to one-half mile. Considerable soil erosion occurred in New Mexico during January, and by the end of the month the soil was beginning to blow in southwestern Kansas.

The storms of February were more numerous and severe than those of January, and were reported over a wider area. Dusty conditions were noted from Brownsville, Tex., northward to the Canadian border, and from New Mexico, Colorado, and central Montana eastward to the Lake region and the Ohio Valley; aviators encountered dust clouds at elevations of 12,000 feet. Observations and computations made by Soil Conservation officials indicated that in one storm, Page County, Iowa, received 274 pounds of dust per acre, while at Sault Ste. Marie, Mich., the fall amounted to 11.65 tons per square mile; Drs. Hunt and Halverson, Northern State Teachers College, estimated the fall at Marquette, Mich., at 14.9 tons to the square mile.

The following extracts are from a letter written by A. E. Osborn, official in charge at the Dodge City, Kans., Weather Bureau office, describing a trip through a portion of the Dust Bowl:

* * * Light dust was blowing with a southwest wind when we left Dodge City, with visibility a little over a mile. Light dust continued until we were about 10 miles north of Liberal (Kans.) where a dense dust cloud blew in from the north and brought visibility down to 15 or 20 feet at once. The driver experienced great difficulty in staying on the road. After an hour or more of this almost blind driving we arrived at Liberal at 7:10 a. m. We left Liberal for Hooker, Okla., at 7:20 a. m. The dust continued very thick and frequent stops were made because the visibility was practically zero. Three hours and forty-five minutes were required to drive the 23 miles. * * * The trip from Liberal, Kans., to Dalhart, Tex., was through part of the very worst section of the Dust Bowl. * * * Through this region there was very little evidence of any moisture in the soil. The topsoil was very dry and powdery and there was practically no moisture * * * for a depth of several feet. Finely powdered dust was in evidence everywhere, in drifts several feet high, depending upon the height of the object causing the drift. Deserted farm homes seemed to be the rule rather than the exception * * * (Feb. 17, 1937).

Severe soil erosion occurred in some southeastern districts of Colorado during this month, and most wheat, and even buffalo grass, suffered. On the 5th visibility was reduced to 100 feet in Baca County, and at Pueblo dense dust prevailed on the 7th for more than 2 hours; zero visibility, lasting from 7 to 10 hours, was reported south of the Arkansas-Platte Divide and east of the mountains. Air and highway traffic was disrupted from 7 to 20 hours per day on the 14–17th, and on the 15th dust was general from Wyoming to the New Mexico border. Kansas had vigorous storms until about the 20th, when several inches of snow fell. Wheat in the western third of Kansas suffered considerable damage. Some stations in Oklahoma reported light to heavy dust on 20 days during the month, and many fields in New Mexico were left ashy, dry, and powdery.

March and April brought the most extensive duststorms that have prevailed in recent months. In March light dust was reported, at the surface or aloft, from the Rocky Mountains eastward to the Atlantic coast, and from extreme southern Texas northward into Canada. Dense dust, however, occurred over nearly the same areas as in the preceding 2 months—portions of the northern and southern Great Plains, southward to Texas, and in the far Southwest.

The most severe storms of March occurred in Kansas, Oklahoma, Texas, New Mexico, and Colorado during the third week, and it was during and after this period that the Middle Atlantic and east Gulf States reported dust.

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At many eastern stations the clouds passed over, reducing ceiling, but not horizontal visibility. In the Dust Bowl visibility was often reduced to zero at the height of the storms, schools were closed, flying schedules canceled, and railway and highway traffic seriously impeded. Near Kingsdown, Kans., on the 25th, a train was delayed several hours while the crew shoveled a dustdrift from the track. Immeasurable damage was done to growing wheat and other crops by the flying sand, and over large areas grass on the southwestern ranges was covered with dust and made unfit for cattle.

Widespread, moderate to substantial rains or snows near the end of the month greatly alleviated, though only temporarily, the dusty conditions over much of the Plains area and the Southwest, leaving those sections in a more promising situation than for many months.

April brought decidedly more than normal precipitation to most eastern and northeastern States, and to limited portions of the northern Great Plains and the far Northwest, but a large western area, reaching from the Plains States westward to the Pacific Coast, received less than normal. Deficiencies were greatest in the southern Great Plains and the Southwest, with totals for the month ranging from 19 percent of normal in Arizona to 32 in Texas and up to 96 percent in Wyoming.

As a result of continued dryness, duststorms were again frequent, and dense dust was reported during the month from Texas and New Mexico northward to Montana and the Dakotas and from Colorado eastward to the Mississippi Valley, while light dust was noted from the Rocky Mountains eastward to the Atlantic Coast. The number of days on which dusty conditions were reported varied widely at different stations, ranging from, one at Hampton Roads, Va., to as many as 19 in portions of Kansas, while in New Mexico strong winds prevailed throughout the month, and local duststorms occurred in some sections of the State every day. At several Lake Region stations, chiefly in Wisconsin and Michigan, the presence of dust in the atmosphere was shown by deposits of mud following showers.

Dense dust was most frequent during the latter half of the month and the dusty conditions in the Atlantic area obtained near the close of April. Visibility during the storms ranged from zero to several miles; in numerous instances it was reduced to less than one mile for several hours—at Havre, Montana, zero visibility on the 13th lasted only 2 minutes, while at Amarillo, Texas, on the 23d the duration was 2 hours. On the 6–8th strong northwest winds in New Mexico caused one of the most severe duststorms of the season; dust on the 6th was confined to the extreme northeast corner of the State, but on the 7–8th it covered all sections between the Rio Grande River and the Colorado State line eastward and southward to Texas. Much damage was done to wheat and other crops in the central portion of this area. On the 28th visibility in northeastern New Mexico was reduced to 25 feet.

In South Dakota duststorms were more numerous than usual and were reported from all sections during the month, especially in the western portion; they were most damaging from the 24th to the 26th. In western Kansas duststorms were especially severe on the 2, 7, 11, 12, 14, 16, 17, 22, 24, and 25th, though all parts of that section were not affected on each of these days. In the southwestern counties the air was more or less filled with dust on from 15 to 19 days of the month and wheat was severely damaged. In Colorado a storm on the 27th made driving extremely dangerous and all air transportation was grounded due to poor visibility. Choun,[1] describing the duststorms in Colorado during the month, says that the storm on the 27th, which covered practically the entire State, was comparable in severity to any during the past 2 years. Travel was hazardous and automobiles were damaged by blowing sand; radio equipment in airplanes was rendered useless and many planes made forced landings due to this cause. A transport plane made a forced landing at Sterling, Colo., after 1,000 automobiles and some fire-fighting apparatus responded to an emergency alarm and lighted the airport with their headlights. The dustfall at Fort Collins, Colo., was estimated at 420 tons per square mile.

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[RICHMOND T. ZOCH, *in Charge of Library*]

By AMY D. PUTNAM

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